WHAT IS CLAIMED IS:

1. An electronic packaging module, comprising:

a plurality of integrated circuit chips stacked and secured together to form a chip stack wherein the chip stack has a first lateral face that is comprised of a first portion of each chip;

an enclosure enclosing the chip stack, wherein the enclosure is configured to receive and enclose a thermally conductive fluid having a thermal conductivity greater than that of air at one atmosphere, wherein said thermally conductive fluid contacts the chip stack and transfers heat therefrom.

2. The module of Claim 1, wherein said thermally conductive fluid comprises a gas.

3. The module of Claim 1, wherein said thermally conductive fluid comprises a liquid.

4. The module of Claim 2, wherein said thermally conductive gas comprises a mixture of hydrogen and helium.

5. The module of Claim 4, said thermally conductive gas comprises about 10% hydrogen and about 90% helium.

6. The module of Claim 2, wherein said thermally conductive gas comprises pure hydrogen.

7. The module of Claim 2, wherein said thermally conductive fluid has a pressure that is higher than a pressure external to the enclosure.

8. The module of Claim 7, wherein said gas is at a pressure between about 5 MPa and 50 MPa.

9. The module of Claim 7, wherein said gas has thermal conductivity between about 1.6×10^{-3} cal-cm/sec-C and 1.6×10^{-2} cal-cm/sec-C.

10. The module of Claim 1, wherein said enclosure is hermetically sealed so as to substantially retain the thermally conductive fluid inside the enclosure.

11. The module of Claim 10 further comprising a bonding substrate, wherein the first lateral face of the chip stack is bonded to an upper surface of the bonding substrate, wherein the enclosure is hermetically sealed to the upper surface of the bonding substrate.

12. The module of Claim 11, wherein said chip stack is bonded to the bonding substrate using C4 connections.

13. The module of Claim 1, wherein said enclosure is made of a thermally conductive material.

14. The module of Claim 13, wherein said enclosure is made of a copper alloy.

15. The module of Claim 1, wherein at least one chip comprises a substrate and a support frame extending from an upper surface of the substrate and along an outer perimeter of the substrate so as to define a spatial region containing interconnection wiring, said support frame comprises a plurality of openings that are configured to permit the thermally conductive fluid to flow therethrough and contact the interconnection wiring in the spatial region.

16. The module of Claim 15, wherein the interconnection wiring comprises air bridge conductors.

17. The module of Claim 16, wherein at least one air bridge conductor is supported by an intermediate post formed on the upper surface of the substrate.

18. The module of Claim 15, wherein the support frame further comprises an upper portion, wherein said upper portion provides a spacer separating the chip from an adjacent chip in the stack.

19. The module of Claim 18, wherein the upper portion of the support frame is dimensioned to achieve a pre-selected distance between the two adjacent chips.

20. The module of Claim 17, wherein said post comprises substantially the same material as that of the air bridge conductor.

21. The module of Claim 17, wherein said post comprises an insulating material.

22. The module of Claim 21, wherein said insulating material comprises SiO_2.

23. The module of Claim 21, wherein said post comprises a polymer.

24. The module of Claim 23, wherein said polymer comprises a polyimide.

25. The module of Claim 15, wherein the support frame further comprises at least one reinforcement ribs that extends across the upper surface of the substrate, wherein said reinforcement rib provides structural support for the chip.

26. The module of Claim 25, wherein said reinforcement rib comprises a metal with an insulating insert material.

27. The module of Claim 26, wherein said insulating insert material is selected from the group consisting of inorganic and organic materials.

28. The module of Claim 19, wherein said chip stack has a second lateral face, wherein the second lateral face comprises a second portion of each chip, wherein an exterior chip is bonded to said second lateral face in a manner such that a first surface of the exterior chip extends across at least a portion of the second lateral face, wherein said exterior chip is bonded to the second lateral face using C4 connections, wherein the C4 connections are aligned with a first and a second row of conductive contacts formed respectively on the adjacent chips that are spaced apart at a pre-selected distance.

29. The module of Claim 1, wherein an insulating material is disposed between adjacent chips in the stack.

30. An electronic packaging module, comprising:

a plurality of integrated circuit chips stacked and secured together to form a chip stack wherein the chip stack has four lateral faces, wherein each lateral face comprises a portion of each chip;

three exterior chips mounted respectively to three of the lateral faces of the chip stack, wherein a surface of each exterior chip extends across at least a portion of each respective lateral face;

a bonding substrate wherein the substrate is electrically connected to the fourth lateral face of the chip stack;

an enclosure enclosing said chip stack, said exterior chips, and at least a portion of said bonding substrate, wherein said enclosure also contains a thermally conductive fluid having a thermal conductivity greater than that of air, wherein said fluid makes contact with at least some of the chips and transfers heat away from said chips.

31. The module of Claim 30, wherein said chip stack comprises memory chips.

32. The module of Claim 31, wherein said exterior chips comprise non-memory chips.

33. The module of Claim 32, wherein said exterior chips comprise logic chips.

34. The module of Claim 33, wherein said exterior chips are electrically connected to the chips in said chip stack by using C4 connections.

35. The module of Claim 33, wherein said exterior chips are interconnected to each other by using edge connections.

36. The module of Claim 33, wherein said exterior chips are interconnected to each other by using a modified C4 connection.

37. The module of Claim 30, wherein said bonding substrate is electrically interconnected to the fourth lateral face of the chip stack by using C4 connections.

38. The module of Claim 30, wherein said enclosure is hermetically sealed.

39. The module of Claim 30, wherein at least one chip in the stack comprises an air bridge structure.

40. The module of Claim 30, wherein at least one opening is formed adjacent the air bridge support so as to permit the thermally conductive fluid in the enclosure to contact the air bridge structure and transfer heat away from the structure.

41. The module of Claim 30, wherein the thermally conductive fluid has a pressure that is higher than pressure external to the enclosure.

42. The module of Claim 41, wherein said gas mixture has a pressure between about 5 mPA and 50 mPA.

43. The module of Claim 42, wherein said gas mixture comprises helium and hydrogen.

44. A method of forming an electronic packaging module, comprising:

forming a support frame on an upper surface of a first semiconductor substrate, wherein said support frame extends from the upper surface of the substrate and defines a protected spatial region for interconnection wiring, wherein said support

frame comprises a plurality of openings on a lateral surface of the frame so as to permit a thermally conductive fluid to travel to and from said spatial region;

forming a plurality of interconnection wiring in said spatial region, wherein the interconnection wiring comprises air bridge conductors;

forming a temporary support material in the spatial region in a manner such that the temporary support material stabilizes and provides structure support for the air bridge conductors;

assembling said first semiconductor substrate in a chip stack, wherein an upper surface of the support frame is positioned adjacent to a lower surface of a second semiconductor substrate;

bonding said chip stack to a bonding substrate, wherein said chip stack is electrically connected to external circuitry formed on said bonding substrate;

removing said temporary support material from the spatial region in a manner such that the air bridge conductors become suspended and surrounded by an air gap;

enclosing said chip stack inside an enclosure;

introducing a thermally conductive fluid to said enclosure, said thermally conductive fluid has a thermal conductivity greater than that of air, wherein said thermally conductive fluid travels through the opening in the support frame and contacts the air bridge conductors formed in the spatial region.

45. The method of Claim 44, wherein forming said temporary support material comprises forming a layer of organic material that can be chemically removed.

46. The method of Claim 45, wherein forming said temporary support material comprises forming a layer of material comprising carbon.

47. The method of Claim 45, where forming said temporary support material comprises forming a layer of material comprising parylene.

48. The method of Claim 47, wherein the parylene is parylene C.

49. The method of Claim 45, wherein forming said temporary support material comprises forming a layer of polymer.

50. The method of Claim 49, wherein said polymer is a high temperature polyimide.

51. The method of Claim 49, wherein said polymer is a photoresist.

52. The method of Claim 44, wherein removing said temporary support material comprises oxidizing said support material.

53. The method of Claim 52, wherein oxidizing said support material comprises oxidizing the material in a molecular oxygen environment.

54. The method of Claim 52, wherein oxidizing said support material comprises oxidizing the material in a plasma environment.

55. The method of Claim 44 further comprising attaching a heat sink to said chip stack prior to removing said temporary support material.

56. The method of Claim 44, wherein introducing said thermally conductive fluid into said enclosure comprises introducing a gas mixture comprising helium and hydrogen.

57. The method of Claim 56, wherein said gas mixture is at a pressure higher than pressure external to the enclosure.

58. An electronic packaging module, comprising:

a plurality of semiconductor substrates stacked and secured together to form a multi-chip structure, wherein the multi-chip structure comprises a plurality of openings that are formed between two adjacent substrates in a manner so as to permit a fluid to circulate in a region between the substrates, thereby providing cooling for the multi-chip structure.

59. The module of Claim 58, further comprising an enclosure wherein said enclosure encloses the multi-chip structure and is configured to receive and enclose a thermally conductive fluid having a thermal conductivity greater than that of air at one atmosphere, wherein said thermally conductive fluid contacts the multi-chip structure and transfers heat therefrom.

60. The module of Claim 58, where said region between the substrates comprises a plurality of air bridge structures.

61. The module of Claim 58, wherein the multi-chip structure has a first lateral face that is comprised a side surface of each substrate.

62. The module of Claim 61, wherein said openings are formed on the first lateral face.